



US009637003B2

(12) **United States Patent**
Léonard et al.

(10) **Patent No.:** **US 9,637,003 B2**
(45) **Date of Patent:** **May 2, 2017**

(54) **PROTECTED SYSTEM FOR CONTROLLING
POWER TRANSACTIONS FOR AN
ELECTRIC VEHICLE**

(71) Applicant: **HYDRO-QUÉBEC**, Montréal (CA)

(72) Inventors: **François Léonard**, Montréal (CA);
Dominique Champagne,
Mont-Saint-Hilaire (CA); **Jacques**
Bherer, Saint-Jean-sur-Richelieu (CA);
Daniel Pineau, Verchères (CA)

(73) Assignee: **HYDRO-QUÉBEC**, Montréal, Québec

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 238 days.

(52) **U.S. Cl.**

CPC **B60L 3/12** (2013.01); **B60L 11/1805**
(2013.01); **B60L 11/1842** (2013.01);
(Continued)

(58) **Field of Classification Search**

CPC **B60L 11/1805**; **B60L 11/1842**; **B60L**
11/1846; **B60L 11/1851**; **B60L 11/1861**;
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,349,535 A 9/1994 Gupta
5,701,068 A 12/1997 Baer et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 1949559 A1 4/2007
CN 101318489 A 12/2008
(Continued)

Primary Examiner — Harry Oh

(74) *Attorney, Agent, or Firm* — Muirhead and Saturnelli,
LLC

(57) **ABSTRACT**

The invention concerns a protected system for controlling power transactions for an electric vehicle. Identification modules are incorporated into the vehicle battery management system and box, and integrity sensors of the box and of the battery are connected to a monitoring module. The system comprises a processing module for processing information produced by the battery management system, the vehicle management unit, the integrity monitoring module, and an identification module for identifying devices connected to a bus between the devices. A memory stores data indicative of technical characteristics of the battery, and data concerning events, transactions and energy depending on the information received. A calculation unit determines an energy balance according to the event, transaction and energy data. A communication module transmits a warning in case of an imbalance in the energy balance and a breach in integrity revealed by the data.

(21) Appl. No.: **14/374,262**

(22) PCT Filed: **Jan. 29, 2013**

(86) PCT No.: **PCT/CA2013/050063**

§ 371 (c)(1),
(2) Date: **Jul. 24, 2014**

(87) PCT Pub. No.: **WO2013/113112**

PCT Pub. Date: **Aug. 8, 2013**

(65) **Prior Publication Data**

US 2014/0365065 A1 Dec. 11, 2014

(30) **Foreign Application Priority Data**

Jan. 30, 2012 (CA) 2765945

(51) **Int. Cl.**

G01M 17/00 (2006.01)

G06F 7/00 (2006.01)

G06F 11/30 (2006.01)

G07C 5/00 (2006.01)

G06F 19/00 (2011.01)

B60L 3/12 (2006.01)

(Continued)

20 Claims, 1 Drawing Sheet

